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NAS FORT WORTH
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FINAL QUALITY ASSURANCE PROJECT PLAN FOR SITE CHARACTERIZATION OF SANITARY SEWER SYSTEM NAS FORT WORTH TX

2/1/1997

INTERNATIONAL TECHNOLOGIES

File: 17G
A.F.

NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 388

HQ Air Force Center for Environmental Excellence

Final
Quality Assurance Project Plan
Addendum
Volume 2

Prepared for:

Site Characterization of the Sanitary Sewer System
Naval Air Station Fort Worth Joint Reserve Base
Carswell Field, Texas

F41624-94-D8047-0039
Project No. 768579

February 1997

FINAL
QUALITY ASSURANCE PROJECT PLAN ADDENDUM
For
Site Characterization of Sanitary Sewer System
Volume 2 of 2 of the Sampling and Analysis Plan

Prepared for
Naval Air Station Fort Worth
Fort Worth, Texas
Revision 1, February 1997

Approved: _____ Date 2/21/97
IT QA/QC Manager

Approved: _____ Date 2/21/97
IT Project Manager

Approved: _____ Date _____
TNRCC

Approved: _____ Date _____
AFCEE Team Chief

Final

Quality Assurance Project Plan Addendum
Site Characterization of Sanitary Sewer System
Naval Air Station Fort Worth
Joint Reserve Base, Carswell Field
Fort Worth, Texas

Prepared for:

Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas
Delivery Order No. 0039

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February 1997

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List of Acronyms

AR	analysis request
AFCEE	Air Force Center for Environmental Excellence
ASTM	American Society for Testing and Materials
°C	degrees Celsius
COC	chain of custody
EDT	electronic data transfer
EPA	U.S. Environmental Protection Agency
FAC	field activities coordinator
FADL	Field Activity Daily Log
FSP	field sampling plan
GC	gas chromatography
HPLC	high-performance liquid chromatography
HASP	health and safety plan
IRPIMS	Installation Restoration Program Information Management System
KCl	potassium chloride
IT	IT Corporation
MS	matrix spike
MSD	matrix spike duplicate
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAS Fort Worth	Naval Air Station Forth Worth, Joint Reserve Base, Carswell Field, Texas
NIST	National Institute of Standards and Technology
nm	nanometer
NPDES	National Pollutant Discharge Elimination System
ppm	parts per million
PQL	practical quantification limit
QA	quality assurance
QAM	quality assurance manual
QAPP	quality assurance project plan
QC	quality control
RCA	recommendations for corrective action

List of Acronyms *(continued)*

RI/RA	remedial investigation/remedial action
RPD	relative percent difference
SAP	sampling and analysis plan
SOP	standard operating procedure
TKN	total Kjeldahl nitrogen
TNRCC	Texas Natural Resources Conservation Commission
USAF	U.S. Air Force

Preface

This quality assurance project plan (QAPP) addendum, along with the revised interim Basewide QAPP presents, in specific terms, the policies, organization, functions, and quality assurance/quality control requirements designed to achieve the data quality goals for environmental services performed at the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field, Texas (NAS Fort Worth). These environmental services will include all aspects of remedial investigation. This QAPP is Part 2 of the sampling and analysis plan (SAP). The field sampling plan (FSP) is Part 1 of the SAP.

The following sections provide in detail all the sections of the 1996 revised interim draft Basewide QAPP prepared by CH2M Hill that fully or partially applies to this project. This QAPP addendum also provides in detail each section that has been supplemented or replaced.

TAB

1.0

1.0 Introduction

Section 1.0 of the revised interim draft Basewide quality assurance project plan (QAPP) (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer system quality assurance (QA) program, which presents the policies, organization, functions, and QA/quality control (QC) requirements designed to achieve the data quality goals for environmental services performed at the Naval Air Station Fort Worth Joint Reserve Base, Carswell Field, Texas (NAS Fort Worth).

TAB

2.0

2.0 Site Description and History

Section 2.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) does not apply to the Carswell Delivery Order No. 0039, sanitary sewer System QA Program. A detailed discussion of the site's description and history are provided in Chapter 2.0 of the work plan.

TAB

3.0

3.0 Project Organization and Responsibility

Section 3.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) does not apply to the Carswell Delivery Order No. 0039 sanitary sewer system QA program. The following text replaces Section 3.0 of the revised interim draft Baseline QAPP entirely.

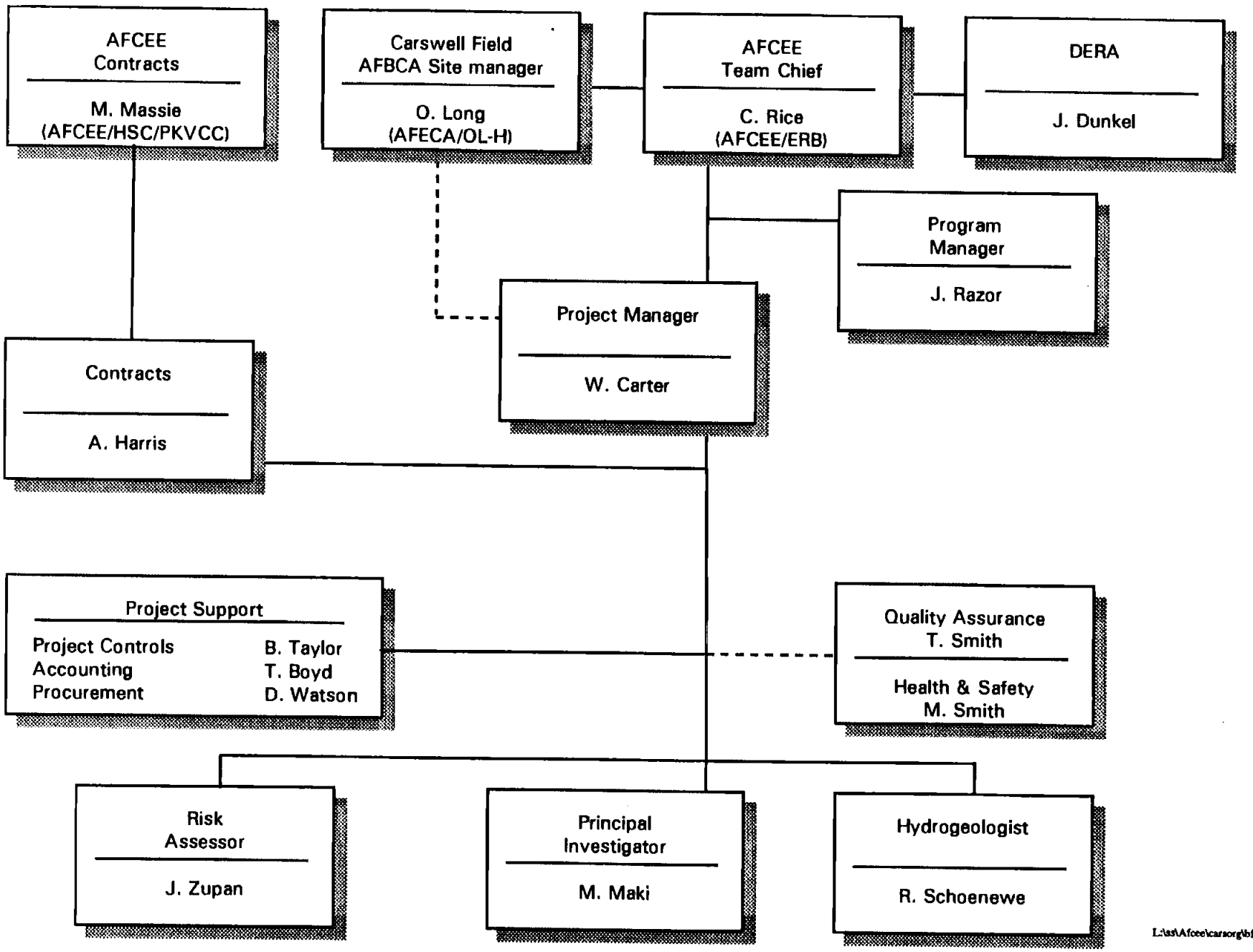
The U.S. Air Force (USAF) is assisted by several contractors, subcontractors, and consultants. In this section, the responsibilities of the key personnel from the participating organizations are defined. Figure 3-1 shows the project organization, reporting relationships, and line authority as it relates to aspects of QA. Key project personnel include the project manager, the program manager, the QA coordinator, the principal investigator, the field investigation team leader, the analytical and data management team leader, the laboratory project manager, the NAS Fort Worth point of contact, and the health and safety coordinator. Their responsibilities are described in the following sections. The names and resumes of the individuals selected for the key project roles will be submitted separately to the Air Force Center for Environmental Excellence (AFCEE). If any of the people assigned to the key project roles become unavailable before the project is completed, they will be replaced with others possessing similar qualifications. AFCEE shall be notified in writing of such personnel changes should they occur. Supporting personnel will be assigned as necessary.

3.1 Program Manager

The program manager's responsibilities will include:

- Reviewing and approving the QAPP, the detailed work plan and sampling and analysis plan (SAP) for each operable unit, and the health and safety plan (HASP)
- Providing sufficient resources to the project team so that it can respond fully to the requirements of the project
- Providing direction and guidance to the project manager, as appropriate
- Reviewing the quality of the data gathered during the course of the project and reviewing the final project report
- Performing responsibilities as requested by the project manager.

Figure 3-1. Project Organization - NAS Fort Worth (Project No. 768579)



3.2 Project Manager

The project manager will be the prime point of contact with NAS Fort Worth and the AFCEE team chief. The project manager will have primary responsibility for technical, financial, and scheduling matters. Duties will include:

- Reviewing and approving the QAPP, the detailed work plan and SAP for each operable unit, and the HASP
- Assigning duties to the project staff and orienting the staff to the needs and requirements of the project
- Obtaining the approval of the QA coordinator for proposed variances to the QAPP, the individual work plan, and SAP
- Providing budget and schedule control
- Reviewing subcontractor work and approving subcontract invoices
- Ensuring that major project deliverables are reviewed for technical accuracy and completeness before their release
- Regularly communicating project status, progress, and any problems to the program manager.

3.3 Quality Assurance Coordinator

Responsibilities of the project QA coordinator, as appropriate, include:

- Serving as official contact for QA matters for the project
- Actively identifying and responding to QA/QC needs, resolving problems, and answering requests for guidance or assistance
- Reviewing, evaluating, and approving the QAPP and approving quality-related changes to the detailed work plan and SAP for each operable unit
- Actively tracking the progress of quality tasks in this plan and periodically consulting with the project and program managers
- Verifying that appropriate corrective actions are taken for all nonconformances

- Verifying that appropriate methods are specified for obtaining data of known quality and integrity
- Providing project-specific training in QA/QC matters to IT Corporation (IT) personnel, as needed, identified, or requested by the project manager
- Scheduling and performing an appropriate QA verification activity for each site to ensure compliance with requirements and procedures
- Performing responsibilities as requested by the project manager
- Ensuring that performance and system audits are performed
- Ensuring that field logs, field variance forms, and other deviations from approved plans are maintained for review upon request by regulatory agencies.

3.4 Field Investigation Team Leader and Principal Investigator/Geologist

The field investigation team leader has primary responsibility for field activities associated with the remedial investigations/remedial actions (RI/RA). The field investigation team leader will direct activities of the subcontractors, including work stoppage and/or taking appropriate emergency actions. The principal investigator/geologist has primary responsibility for the preparation of the RI/RA reports based on the field sampling and analytical data. The principal investigator/geologist shares responsibility for field activities with the field investigation team leader and could be called upon to supervise field activities as necessary. Their duties and responsibilities are as follows:

- Coordinating field activities with the AFCEE team chief and NAS Fort Worth point of contact
- Coordinating activities with the project manager
- Interfacing on analytical and data management with the analytical and data management team leader
- Being on site during field activities
- Providing orientation and any necessary training to field personnel (including subcontractors) on the requirements of the detailed work plan and sampling plan for each operable unit, the QAPP, and HASP before the start of work

- Providing direction and supervision to the drilling contractor during the drilling of soil borings
- Monitoring drilling and sampling operations to ensure that the drilling contractor and sampling team members adhere to the QAPP and the detailed work plan and sampling plan for each operable unit
- Ensuring that field QA/QC requirements are followed and that the field records management system is maintained
- Reviewing and implementing geologic data collection plans and supervising borehole logging and other geological data interpretation activities
- Preparing RI/RA reports summarizing the field and analytical data
- Reviewing reports for compliance with Texas Natural Resources Conservation Commission (TNRCC) requirements
- Executing the duties of the health and safety coordinator at the direction of the health and safety coordinator
- Reporting field nonconformance(s) to the project manager and QA coordinator
- Participating in the process of resolving field nonconformance(s) and the implementation corrective actions to prevent reoccurrence of any problems

3.5 Analytical and Data Management Specialist

The analytical and data management specialist is responsible for managing the data generated by the investigation in accordance with Installation Restoration Program Information Management System (IRPIMS), and other requirements as specified by AFCEE. The duties and responsibilities include the following:

- Participating in the preparation of the site-specific work plans, SAPs, and the QAPP
- Preparing the field sampling analytical programs
- Communicating to the project personnel the requirements necessary for the data base initialization and management

- Establishing and maintaining the sample tracking system. Tracking the progress of environmental samples throughout the process of acquisition, transportation, receipt, analysis, data validation, and data reporting
- Coordinating with the on-site principal investigator/geologist and/or the field investigation team leader
- Verifying the receipt of samples with the subcontracted laboratory
- Coordinating with laboratory on QA/QC matters
- Resolving all QC problems with the laboratory and reporting them to the project manager
- Interfacing with laboratory for ensuring the maintenance of laboratory logs
- Reviewing all chemical analytical data for compliance with QC requirements and technical accuracy
- Reviewing laboratory QA/QC reports and identify potential or existing problems
- Receiving all of the sample information, including the field logs and results from the field and the laboratory
- Ensuring all the analytical data packages are validated
- Overseeing the data entry into the database including data entry QA
- Providing orientation and any necessary training to laboratory personnel on the requirements of the QAPP and the detailed work plan and SAP for each operable unit
- Serving as the "collection point" for laboratory staff reporting of nonconformances and changes in laboratory activities
- Notifying the laboratory and QA personnel of specific laboratory nonconformances and changes

3.6 NAS Fort Worth Point of Contact

The duties and responsibilities for the NAS Fort Worth Base Environmental Coordinator designee include the following:

- Coordinating activities with the AFCEE team chief
- Coordinating activities with the appropriate Base agency(s)
- Providing security escort in all controlled areas
- Obtaining Base clearance for digging permits for each site of intrusive investigation
- Providing the analytical information required for preparation of the hazardous waste manifest to the government-authorized representative
- Reviewing reports and permits for compliance with State of Texas, U.S. Environmental Protection Agency (EPA), and USAF regulations
- Maintaining the information repository containing all primary deliverable documents
- Notifying appropriate authorities of any deviations from approved procedures.

3.7 Health and Safety Coordinator

The health and safety coordinator or his/her designee will be responsible for seeing that site personnel adhere to the site safety requirements. Additional responsibilities are included in the NAS Fort Worth HASP. Either the principal investigator/geologist and the field investigation team leader may assume the role of health and safety coordinator at the discretion of the health and safety coordinator.

3.8 Subcontractor Activities

The selection of qualified subcontractors will be in accordance with the IT procurement and QA procedures. Subcontractors, such as analytical laboratories, drillers, geophysical specialists, surveyors, and environmental monitoring specialists, must meet predetermined qualifications developed by the project manager that are defined in the procurement bid packages. Each subcontractor bid submittal will be reviewed by technical and purchasing personnel to verify that the bidders are qualified and can satisfy bid requirements. A review of the subcontractor's file will be conducted before starting work, to determine if the subcontractor has fulfilled the procurement requirements necessary to begin activities. Subcontractors involved in environmental measurements will be monitored by the principal investigator/geologist and the field investigation team leader to verify the use of calibrated equipment and qualified operators.

Subcontracted laboratories will be monitored by the analytical and data management team leader to verify compliance with this QAPP and all site-specific plans, as well as IT and AFCEE requirements.

3.9 Qualifications and Training of Personnel

Personnel assigned to the project, including field personnel and subcontractors, will be qualified to perform the tasks to which they are assigned. In addition to education and experience, specific training may be required to qualify individuals to perform certain activities. Training will be documented on the appropriate form and placed in the project file as a record. Project personnel will receive an orientation to the detailed work plan and SAP for each operable unit, the HASP, and the QAPP as appropriate to their responsibilities before participation in project activities. This orientation will be documented.

TAB

4.0

4.0 Quality Program and Data Quality Objectives

Chapter 4.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program.

TAB

5.0

5.0 Sampling Procedures

Section 5.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) does not apply to the Carswell Delivery Order No. 0039 sanitary sewer system QA program. The following text replaces Section 5.0 of the revised interim draft Basewide QAPP entirely.

5.1 Field Sampling

Detailed work plans and SAPs are being prepared for the characterization of the sanitary sewer system at NAS Fort Worth to document the scope, rationale of exploration, and the sampling activities at each of the sites.

The following considerations form the basis for the site-specific sampling and analysis programs:

- Selection of sampling and drilling sites
- Frequency of sampling
- Methods of sampling to be employed
- Media to be sampled
- Number of samples to be collected
- Volume of samples to be collected
- Types of field QC sample to be collected
- Types and kinds of analyses to be performed in the field
- Types and kinds of analyses to be performed at the laboratories
- Sample turnaround time
- Procedures and precautions to be followed during sampling
- Methods of preservation and shipment.

The methods described in this section are detailed in the work plan and SAPs for each site. The procedures are specifically designed to ensure the collection and preservation of accurate, precise, comparable, and representative samples.

Sampling will be frequent enough to identify materials and to describe important material changes. Methods of sampling employed shall preserve the integrity of material parameters. Field procedures for the collection of soil, water, and wipe samples for analysis are discussed in the site-specific SAPs.

Any sample obtained during field sampling should be representative of the sample location and free of contaminants from sources other than the immediate environment being sampled. The equipment and the techniques that will be employed to obtain representative samples will be in accordance with IT's standard operating procedures (SOP). Rationale for each site-specific sampling program is presented in the respective SAP for each site.

The specific SAPs describe the sampling location design considerations for soil borings and water samples; the numbers and types of samples to be collected; sampling equipment, procedures, and sample containers; methods of sample preservation; decontamination procedures; and shipping and packaging methods. Analytical tests that will be performed are also described. A list of containers are provided in Table 3-1 and Table 3-2 of the field sampling plan (FSP). Table 5-1 provides a summary of all soil borings and groundwater samples that will be collected.

EPA has developed specific procedures for the preparation of sample containers to be used for site investigations. Sampling containers will be provided by the analytical laboratory and will be precleaned in accordance with EPA protocols.

Prevention of Cross Contamination. Before entering the site, the drill rig will have been steam-cleaned to remove any surface oil, grease, or other material that has the potential for contaminating the site. Drilling equipment that will be in contact with the soil will be decontaminated before use and between each borehole. Sampling equipment will be decontaminated before use and between each sample. Each decontamination activity will be recorded on the Field Activity Daily Log (FADL) (Figure 5-1). Detailed procedures for decontamination of drilling and sampling equipment and disposal of decontamination by-products are provided in the site-specific FSP.

Area Monitoring. Ambient air monitoring will be conducted in accordance with the HASP and as required by the site-specific FSP. The HASP includes procedures for operating, maintaining, and calibrating the air monitoring instruments to be used for this project. Results of air monitoring will be recorded on the FADL.

Table 5-1
Summary Table of all Soil and Water[a] Samples
Sanitary Sewer RFI Field Sampling Plan
NAS Fort Worth
Project No. 768579

Parameter	Analytical Method	Matrix	Number of Field samples	Field Duplicate 10%	Matrix Spike 5%	Matrix Spike Duplicate 5%	Material Blank 1 per source/ matrix	Equip. Rinsate 1 per Day	Trip Blank 1 per VOA cooler	Total No. of Samples	Combined Total No. of Water/Soil Samples
Volatiles	SW8260	Soil	424	42	21	21	2	30	60	600	
		Water	44	4	2	2	2	20	20	94	
		Combined									694
Semivolatiles	SW8270	Soil	464	46	23	23	2	30	0	588	
		Water	44	4	2	2	2	20	0	74	
		Combined									662
RCRA Metals	SW6010/7000	Soil	424	42	21	21	2	30	0	540	
		Water	44	4	2	2	2	20	0	74	
		Combined									614
Pest/PCB[b]	SW8080	Soil	262	26	13	13	2	30	0	346	
		Water	0	0	0	0	0	0	0	0	
		Combined									346
Nitrate[c]	EPA 300.0	Water	14	1	1	1	2	5	0	24	24
Sulfate[c]	EPA 300.0	Water	14	1	1	1	2	5	0	24	24
TDS	EPA 160.1	Water	14	1	0	0	0	0	0	15	15
Volatiles[d]	SW8240 (48 hr. TAT)	Soil	60	6	3	3	2	30	30	134	134
TPH-Gasoline[e]	SW8015M (48 hr. TAT)	Soil	60	6	3	3	2	30	0	104	104
TPH-Jet Fuel[f]	SW8015M (48 hr. TAT)	Soil	60	6	3	3	2	30	0	104	104
RCRA Metals	SW6010/7000 (48 hr. TAT)	Soil	43	4	2	2	2	30	0	83	83
Biotechnical	See Table 3-5 in	Soil	12	1	0	0	1	1	0	15	
	Field Sampling Plan	Water	10	1	0	0	1	1	0	13	
		Combined									28
Geotechnical	See Table 3-6	Soil	12	0	0	0	0	0	0	12	12
Field Parameters	See Table 3-7 in Field Sampling Plan	Soil	10	1	0	0	0	0	0	11	
		Water	14	1	0	0	0	0	0	15	
		Combined									26

[a] Groundwater and surface water.

[b] Pest/PCB QC water samples collected in 1 liter glass, no preservative (hold time = 7 day preext., 40 day postext.)

[c] Nitrate and Sulfate to be collected in the same bottle

[d] Volatile QC water samples: collected in 3 * 40 ml glass amber vials, preserved in HCL with 14 day hold time

[e] TPH Gasoline QC water samples: collected in 3 * 40 ml glass amber vials, preserved in HCL with 14 day hold time

[f] TPH- Jet Fuel QC water samples: collected in 2 * 1 liter glass amber, no preser. with 7 day hold time

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FIELD ACTIVITY DAILY LOG

DATE				
NO.				
SHEET ___ OF ___				

PROJECT NAME	PROJECT NO.
FIELD ACTIVITY SUBJECT:	
DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:	
VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE	DATE:

Figure 5-1
NAS Fort Worth
Project No. 768579

Sample Identification. Samples will be put into sample containers that have been supplied by the analytical laboratory. The cleaning and preservation procedures for containers are to EPA specifications. The labels on containers provided by the laboratory will state the type preservative, if any, and the sample type for which the container is intended. As samples are collected and sealed in containers, the containers will be marked. The sample identification and numbering procedure is described in the site-specific SAPs. After collection, identification, and preservation, samples will be maintained under the chain-of-custody (COC) procedure described in detail in Section 5.2 of this document.

Sample Turnaround Time. Sample analyses will be scheduled based on site investigation needs and consistent with the sample holding times specified herein. The site-specific work plan and SAPs are organized to provide a turnaround time that will meet the project schedule and objectives. Normal turnaround time (35 working days) will be utilized for all analyses unless otherwise specified in the site-specific plans.

Field Documentation. Original data recorded in field notebooks, COC records, and other forms will be written in water-resistant ink. None of these documents will be altered, destroyed, or discarded, even if they are illegible or contain inaccuracies that require correction. If an error is made, the document will be corrected by the individual who made the entry. A single line will be drawn through the incorrect information and the correct information will be entered. All corrections will be initialed and dated.

An integral part of the QAPP for the field activities will be maintaining a FADL (Figure 5-1). Information identified on the FADL will be obtained from site investigation and sampling activities and will be documented by the field investigation team leader or principal investigator/geologist, or his/her designee, such as the sampling team leader.

All general information pertinent to field activities will be recorded in the FADL. Entries in the log will include as a minimum:

- The names and affiliations of all on-site personnel associated with the field activities
- A general description of the day's field activities

- Documentation of weather conditions
- Field measurements not recorded on specific forms and readings from personnel safety instruments.

Field equipment and equipment calibration will be noted on the Test Equipment List and Calibration Log as described in Section 6.2 of the 1996 interim draft basewide QAPP prepared by CH2M Hill.

Specific field data forms will be prepared for each field effort based on the requirements in the specific work plans and SAPs. Generic forms are included as Appendix A to this QAPP addendum.

Variance System. Procedures that properly address all specific conditions encountered during a field program cannot be prepared. Variances from approved operating procedures in the FSP, the QAPP, or the HASP will be documented on a Variance Form (Figure 5-2). The field investigation team leader or principal investigator/geologist will initiate and chronologically maintain the Variance Log (Figure 5-3). Variances require the approval of the project manager and the QA coordinator before work proceeds. Variances affecting project scope, costs, or schedule must be approved by the project manager. Any variance from the HASP must be approved by the health and safety coordinator. Approval by the project manager can be initiated on a verbal basis via telephone with follow-up sign-off. In no case will an IT subcontractor initiate a variance. If a variance is proposed by the client, it will be so recorded. Copies of the Variance Log will be kept on site until the field work is complete and then will be sent to the project files.

Field Data Management. Numerical analyses, instrument readings and recordings, measurements, and tests will be documented and subjected to internal review. Field records will be legible and sufficiently complete to permit reconstruction of data-gathering activities by a qualified individual other than the originator when data are reduced. The method of data reduction will be identified and recorded. Field-generated data logs will be collected and reviewed weekly for accuracy and completeness by the field investigation team leader, the principal investigator/geologist, and the analytical and data management task leader. The data logs will be assembled into packages that represent each borehole, monitoring well, etc. These

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VARIANCE FORM

VARIANCE NO._____

PROJECT NO. _____ PAGE _____ OF _____

PROJECT NAME _____ DATE _____

VARIANCE (INCLUDE JUSTIFICATION)

APPLICABLE DOCUMENT:

CC:

REQUESTED BY _____ DATE _____

APPROVED BY _____ DATE _____
Project Manager

_____ DATE _____
Quality Assurance Officer

_____ DATE _____

Figure 5-2
NAS Fort Worth
Project No. 768579

INTERNATIONAL TECHNOLOGY CORPORATION

VARIANCE LOG
CHRONOLOGICAL LIST OF PROJECT VARIANCES

PROJECT NUMBER _____ PAGE _____ OF _____

PROJECT NAME _____

DATE	VARIANCE GRANTED AND APPLICABLE DOCUMENT	RESPONSIBLE INDIVIDUAL

Figure 5-3
NAS Fort Worth
Project No. 768579

data sheet record packages will be sent to the IT Project Management Office in Knoxville, Tennessee for review. Data logs will be used to perform investigative studies and reports. Field data will be formatted and archived in accordance with the requirements of IRPIMS. Reporting of applicable field data will be included in the IRPIMS data submittal.

5.1.1 Sample Containers

Sample containers are purchased precleaned and treated according to EPA specifications for the methods. Sampling containers that are reused are decontaminated between uses by the EPA-recommended procedures. Containers are stored in clean areas to prevent exposure to fuels, solvents, and other contaminants. Amber glass bottles are used routinely where glass containers are specified in the sampling protocol.

5.1.2 Sample Volumes, Container Types, and Preservation Requirements

Sample volumes, container types, and preservation requirements for the analytical methods performed are listed in Tables 3-1 and 3-2 of the FSP.

5.2 Sample Handling and Custody

Procedures to ensure the custody and integrity of the samples begin at the time of sampling and continue through transport, sample receipt, preparation, analysis and storage, data generation and reporting, and sample disposal. Records concerning the custody and condition of the samples are maintained in field and laboratory records.

The following information concerning the sample will be documented on a COC form:

- Unique sample identification
- Date and time of sample collection
- Source of sample (including name, location, and sample type)
- Preservative used
- Analyses required
- Name of collector(s)

- Pertinent field data (pH, temperature, etc.)
- Serial numbers of custody seals and transportation cases (if used)
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratory or laboratories.

All samples will be uniquely identified, labeled, and documented in the field at the time of collection.

COC procedures will document sample possession from the time of collection to disposal, in accordance with IT internal procedures and the federal guidelines. Figure 5-4 is a copy of IT's analysis request (AR)/COC record form. A sample is considered in custody if:

- It is in the sampler's or the transferee's actual possession.
- It is in the sampler's or the transferee's view, after being in his/her physical possession.
- It was in the sampler's or the transferee's physical possession and then he/she secured it to prevent tampering.
- It is sealed in a shipping container, placed in a designated secure area, or delivered to the IT courier or the common carrier.

The analytical laboratory will not accept samples collected for analysis without a correctly prepared AR/COC record form.

5.3 Field Custody Procedures

Field custody activity includes:

- Before sampling begins, the field investigation team leader or principal investigator/geologist will instruct site personnel in the COC procedures, as necessary.
- The quantity and types of samples and sample locations have been specified in the FSP.

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 472857
Page 1 of ____

Project Name/No. [1]
Sample Team Members [2]
Profit Center No. [3]
Project Manager [4]
Purchase Order No. [6]
Required Report Date [11]

Samples Shipment Date [7]
Lab Destination [8]
Lab Contact [9]
Project Contact/Phone [12]
Carrier/Waybill No. [13]

Bill to: [5]
Report to: [10]

White: To accompany samples
Yellow: Field copy

ONE CONTAINER PER LINE

Sample Number [14]	Sample Description/Type [15]	Date/Time Collected [16]	Container Type [17]	Sample Volume [18]	Pre-servative [19]	Requested Testing Program [20]	Condition on Receipt [21]	Disposal Record No. [22]

FOR LAB USE ONLY

FOR LAB USE ONLY

*See back of form for special instructions.

Special Instructions: [23]

Possible Hazard Identification: [24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: [25]
Return to Client ☐ Disposal by Lab ☐ Archive _____ (mos.)

Turnaround Time Required: [26]
Normal ☐ Rush ☐

QC Level: [27]
I. ☐ II. ☐ III. ☐ Project Specific (specify): _____

1. Relinquished by [28] (Signature/Affiliation)	Date: Time:	1. Received by [28] (Signature/Affiliation)	Date: Time:
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

MCA 3/15/91

Figure 5-4
Chain-of-Custody
Project No. 768579

- The field investigation team leader or principal investigator/geologist determines whether proper custody procedures and report forms were used during the field work and documented in FADL.

- The field investigation team leader or principal investigator/geologist has overall responsibility for the care and custody of the samples collected until they are transferred or properly dispatched to the laboratory. Each individual who collects a sample is responsible for sample custody until transferred to someone else via the AR/COC record.

- AR/COC records initiated in the field shall be placed in a plastic bag and taped to the inner lid of the shipping container used for sample transport from the field to the laboratory.

- Samples collected during the site work are classified as environmental or hazardous. All sample shipping will be done in accordance with the provisions stated in the IT *Manual of Practice: Sample Packaging and Shipment.*

- Shipping containers shall be secured using strapping tape and custody seals to ensure that samples have not been disturbed during transport. The custody seals shall also be placed on each container so that they cannot be opened without breaking the seal. All openings will be taped shut to prevent potential leakage during transport.

- Shipment information will be recorded for shipment of samples at the end of the shift, day, or collection period on the FADL and on the sample collection logs.

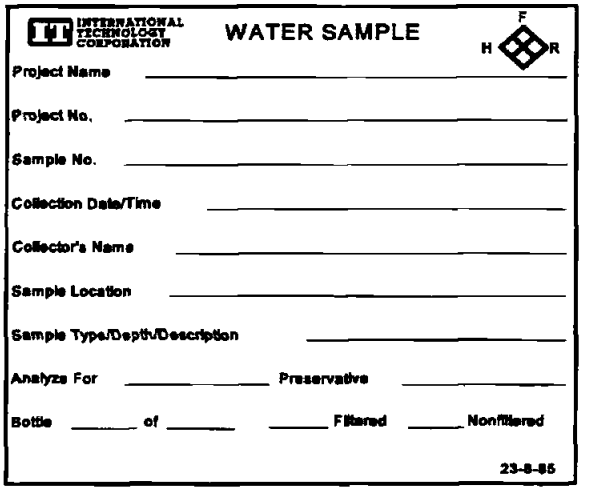
5.4 Sample Labeling

Sample labels must contain sufficient information to uniquely identify the sample in the absence of other documentation. Labels will include at a minimum:

- Project name and number
- Unique sample number
- Sample location
- Sampling date and time
- Signature or initials of the individual(s) collecting the sample
- Preservation method employed.

The sample labels (Figure 5-5) will be directly affixed to the sample container and will be preprinted or completed using indelible ink. The sample identification and information will be logged in the sample collection logbook.

SAMPLE LABELS



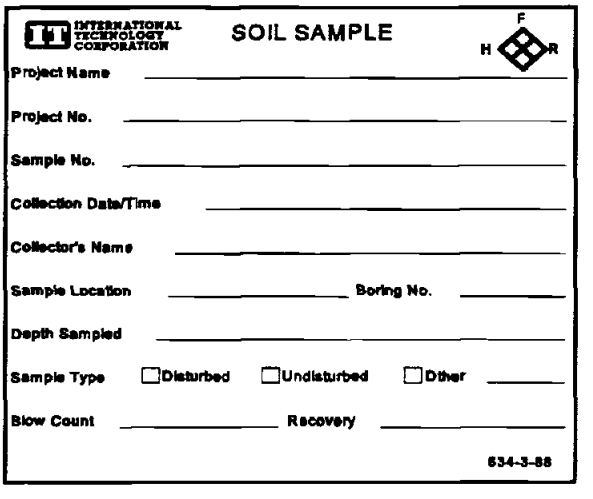


Figure 5-5
NAS Fort Worth
Project No. 768579

5.5 Transfer of Custody and Shipment

Transfer of custody and shipping procedures include:

- An AR/COC record will be initiated in the field for each sample. A copy of this record will accompany each sample.
- If the laboratory sample custodian judges sample custody to be invalid (e.g., samples arrive damaged or custody seals have been broken), a Nonconformance Report form will be initiated. The analytical and data management task leader and the project manager will be advised immediately and the samples will not be analyzed unless the project manager so authorizes. The QA coordinator will also be notified. The project manager will make a decision as to the fate of the sample(s) in question.

The sample(s) will either be processed "as is" with custody failure noted along with the analytical data, or rejected with sampling rescheduled if necessary. The analytical and data management task leader, the project manager, and QA coordinator will sign off the Nonconformance Report, noting the reason for disposition.

- Each time responsibility for custody of the sample changes, the new custodian will sign the record and note the date. If shipment is via Federal Express (or equivalent courier service) and its agent will not be required to sign the record, the IT employee shipping the samples will note on the form "Provided to Federal Express on date." The person receiving must sign as having received the package.
- The custody of individual sample containers will be documented by recording each container's identification on an appropriate AR/COC record.
- The analyses to be performed for each sample will be recorded on the AR/COC record form.
- Upon sample destruction or disposal, the custodian responsible for the disposal will complete the AR/COC record, file a copy, and send a copy to the project manager or to his designated representative for record keeping.

5.6 Laboratory Receipt and Entry of Samples

Upon receipt at the laboratory, a sample is removed from the shipping container and the sample identification is compared to the information contained on the sample bottles to the COC

documents. If discrepancies exist, appropriate notes (signed and dated) are made on the COC document and the shipping and receiving supervisor is notified.

The following items are checked upon receipt of samples with the COC document:

- The seals and tapes on the sample containers and the cooler are unbroken and uncut.
- The sample containers in the cooler are intact and inside temperature is recorded.
- The identification on the sample bottles corresponds to the entries on the accompanying forms.
- The number of sample containers received (i.e., bottles) is equal to the number of samples listed on the COC or accompanying forms.

Identification numbers are stamped on labels and securely wrapped about each sample. If samples are to be shipped from one laboratory to another, proper COC and packaging procedures will be maintained.

5.7 Preanalysis Storage

Personnel from the appropriate analytical laboratory group receive and log in the samples. These personnel have the responsibility of picking up samples that are specific to their group from shipping and receiving. The samples are then placed into temporary storage until analysis.

Samples are stored as prescribed in the analytical laboratory-specific Quality Assurance Manual (QAM). Methods of storage are intended generally to:

- Retard biological action.
- Retard hydrolysis of chemical compounds and complexes.
- Reduce volatility of constituents.
- Reduce adsorption effects.

Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing. Preanalysis sample storage procedures are described specifically in the analytical laboratory-specific QAM.

5.8 Postanalysis Storage

Anticipation of reanalysis prescribes proper environmental control. If reanalysis is not anticipated, environmental conditions are not observed, and the samples are stored at room temperature. Postanalysis environmental control of samples is specifically addressed in the analytical laboratory-specific QAM. Disposal of samples will be in accordance with federal and state regulations.

Depending upon regulatory and client requirements, samples remaining after testing is completed may be disposed of at the option of the project manager. In general, samples shall not be kept longer than 6 months. Transferal to the client or owner may be arranged, as appropriate.

Samples collected in the field will be transported to the laboratory or field testing site as expeditiously as practical. When a 4 degrees Celsius (°C) requirement for preserving the sample is indicated, the samples will be packed in ice or chemical refrigerant to keep them cool during collection and transportation. During transit, it is not always possible to rigorously control the temperature of the samples. As a general rule, storage at low temperature is the best way to preserve most samples. It is impossible to set acceptance temperature limits for the cooler temperature because of the complexity of the issue. When, in the judgment of the laboratory, the temperature of the samples upon receipt may have affected the stability of the analytes of interest, the problem will be documented in laboratory records and discussed with AFCEE. The resolution of the problem will also be documented.

Once the samples reach the laboratory, they will be checked against information on the COC form for anomalies. The condition, temperature, and appropriate preservation of samples will be checked and documented on the COC form. The checking of the pH of samples using pH paper is an acceptable procedure. The occurrence of any anomalies in the received samples and their resolution will be documented in laboratory records. All sample information will then be entered into a tracking system, and unique analytical sample identifiers will be assigned. A copy of this information will be reviewed by the laboratory for accuracy. Sample holding time tracking begins with the receipt of samples and entry of the sample information into the tracking system and continues until the results are reported. Holding times for methods required routinely for AFCEE work are specified in FSP. **Samples not preserved or analyzed in**

accordance with these requirements will be resampled and analyzed within the specified holding times. As an alternative, AFCEE will be contacted in writing to obtain a variance. Subcontracted analyses will be documented with a COC form. Procedures ensuring internal COC will also be maintained. Specific instructions concerning the analysis specified for each sample will be communicated to the analysts. Analytical batches will be created, and laboratory QC samples will be introduced into each batch.

While in the laboratory, samples will be stored in limited-access, temperature-controlled areas. Refrigerators and coolers will be monitored for temperature. Acceptance criteria for the temperatures of the refrigerators and coolers is 4°C plus or minus 2°C. Freezers will also be monitored for temperature each working day. Acceptance criteria will be available and in use to assess the adequacy of freezer temperatures. All of the cold storage areas will be monitored by thermometers that have been calibrated with a National Institute of Standards and Technology (NIST)-traceable thermometer. As indicated by the findings of the calibration, correction factors will be applied to each thermometer. Records that include acceptance criteria will be maintained. Samples for volatile organics determination will be stored separately from other samples, standards, and sample extracts. Soil and water for volatile determinations will also be stored separately. Samples will be stored after analysis until disposed of in accordance with applicable local, state, and federal regulations. Disposal records will be maintained.

SOPs describing sample control and custody are documented and reviewed during the audits.

TAB

6.0

6.0 Screening Analytical Methods

Section 6.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program. Analytical screening methods 6.1 through 6.1.14 are supplemented by the additional field screening method descriptions and calibration requirements. Table 6-1 provides the additional summary of calibration and QC procedures for screening methods. The following are the additional screening method descriptions and calibration requirements.

6.1 Ferrous Iron: Standard Methods for Examination of Water and Wastewater - Method 3500

Two methods of colorimetric iron analysis are presented in the following procedure. The 1,10-phenanthroline method is the most well-known test for ferrous and total iron. The 1,10-phenanthroline reagent gives an orange color with ferrous iron and is free from common interferences. The indicator is combined with a reducing agent for total iron analysis in a single power formulation called Ferro Ver® Iron Reagent. The amount of ferric iron present can be determined as the difference between the amount of ferrous iron and the results of a total iron test. The Ferro Ver Iron Reagent converts all iron present in the sample to the ferrous state, including precipitated or suspended iron such as rust, whereby it reacts with the 1,10-phenanthroline to give the orange color necessary for the determination. This test has been approved by the EPA for National Pollutant Discharge Elimination System (NPDES) reporting purposes based on comparability studies if the sample is first digested. Testing done for nonreporting purposes generally does not require sample digestion.

6.1.1 Carbon Dioxide: Standard Methods for Examination of Water and Wastewater - Method 4500

The analysis for carbon dioxide is similar to that for acidity. A water sample is titrated to a phenolphthalein with sodium hydroxide standard solution. Strong mineral acids are assumed to be absent or their effect negligible. Care must be taken during the analysis to minimize the loss of carbon dioxide from the water sample as a result of aeration when collecting and swirling the sample.

Table 6-1

Summary of Calibration and QC Procedures for Screening Methods
Sanitary Sewer System RFI Field Sampling Plan
NAS Fort Worth
Project No. 788579

Method	Applicable Parameter	QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action
LandTec GA90	Methane, Oxygen, CO_2	Field 2 pt. calibration	twice per Day	RPD < 20%	Recalibrate/ Correct Problem
Stand. Methods, 3500	Ferrous Iron	Field 1 pt. calibration	once per day	±5 %	Evaluate results for comparibility, repeat measurement
Stand. Methods, 4500	Sulfide	Field 1 pt. calibration	once per day	±5 %	Evaluate results for comparibility, repeat measurement
Stand. Methods, 4500	Carbon Dioxide	Field 1 pt. calibration	once per day	±5 %	Evaluate results for comparibility, repeat measurement
EPA 120.1	Specific Conductance	Calibration with KCL standard	Once per day beginning of testing	±5 %	Evaluate results for comparibility, check meter, standards and probe, replace if necessary

6.1.2 Sulfide: Standard Method 4500

Sulfide is a poisonous by-product of the anaerobic decomposition of organic matter and commonly is found in sewage and industrial wastewaters. Sulfide can be present as the free sulfide ion (S^{2-}) or as dissolved oxygen sulfide (H_2S and HS^-). The toxicity of hydrogen sulfide is equivalent to that of hydrogen cyanide but its offensive odor is detectable long before toxic levels are reached.

The sulfide test is based on the ability of hydrogen sulfide and acid-soluble metallic sulfides to convert N,N-di-methuyl-p-phenylendediamine oxalate directly to methylene blue. The intensity of the methylene blue color developed is directly proportional to the amount of sulfide present in the original sample.

6.1.3 Methane, Oxygen, and Carbon Dioxide: Lantec GA-90

The GA-90 is a compact field instrument that can be configured to analyze the methane (CH_4), carbon dioxide (CO_2), and oxygen (O_2) levels in landfill gas. The GA-90 can be used by landfill technicians in monitoring migration probes, active and passive gas extraction systems, and measuring landfill gas at flares or other approved control systems. The GA-90 uses computer technology with on-screen menus to provide a simplified user interface for accurate data analysis and recording while eliminating the need to carry many separate field instruments. The GA-90 gas analyzer is designed for all passive landfill gas monitoring appliance.

6.1.4 Conductance: EPA Method 120.1

Sample conductance will be measured on site using EPA Method 120.1. Standard conductivity meters are used, and the electrode is rinsed with sample before conductance is measured; temperature is also reported. The meters are standardized daily using potassium chloride (KCl) solutions of known conductance.

TAB

7.0

7.0 Definitive Data Analytical Methods and Procedures

Section 7.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program. Preparation methods 7.1 through 7.1.8, as well as analytical procedures 7.2 through 7.2.32 are supplemented with the following text. Table 7-1 provides a summary of geotechnical calibration checks, interval acceptance criteria, and applicable methods.

7.1 Grain Size: American Society for Testing and Materials (ASTM) D-422

Grain-size analysis determines the quantitative determination of the distribution of particle sizes in soils. The distribution of particle sizes larger than 75 microns is determined by sieving, while the distribution of particle sizes smaller than 75 microns is determined by a sedimentation process, using a hydrometer to secure the necessary data.

7.2 Moisture Content: ASTM D-2216

Moisture content analysis determines the amount of water content by mass of a soil sample or other type matrix. The water content of a material is defined by this standard as the ratio, expressed as a percentage of the mass of "pore" or "free" water in a given mass of material to the mass of the solid material.

7.3 Fraction Organic Content: EPA 415.1

Organic carbon is converted to carbon dioxide (CO_2) by catalytic combustion or wet chemical oxidation. CO_2 formed can be measured by infrared detector or converted to methane (CH_4) and measured by flame ionization.

7.4 Permeability: ASTM D-5084

Permeability analysis is a laboratory measurement of the hydraulic conductivity (coefficient of permeability) of water-saturated porous materials with a flexible wall permeameter. The test applies to one-dimensional laminar flow of water within porous materials such as soil and rock.

Table 7-1

Summary of Geotechnical Calibration Checks, Interval Acceptance Criteria, and Applicable Methods
NAS Fort Worth
Project No. 768579

Equipment	Calibration Interval	Type of Calibration	Acceptance Criteria	Applicable Method
Thermometer	Annual	3-point comparison to standard thermometer	± 1°Celsius	Grain-size/ASTM D-422, Specific Gravity ASTM D-854
Balance	Quarterly	Calibrated against Class S weights	± 0.2%	Applicable to all tests
Sieve Shaker	Annual	A calibrated set of calipers, gauge blocks, tape measure, or ruler is used to measure the hammer drop.	Hammer drop should be </=1-3/8 inches or >>/=1-1/4 inches	Grain size/ASTM D-422
Hydrometer	24 months	Visual inspection of body, stem, scale graduation and markings. Observe reading of meniscus on stem of hydrometer after placed in 1-liter jar of deionized water	Reading should be ± 1 division	Grain size/ASTM D-422

Table 7-1

Summary of Geotechnical Calibration Checks, Interval Acceptance Criteria, and Applicable Methods
NAS Fort Worth
Project No. 768579

Equipment	Calibration Interval	Type of Calibration	Acceptance Criteria	Applicable Method
Vacuum System	Annual	Check vacuum	<100 mm of Hg	Permeability/ASTM D-5084
Permeability Panel	24 months	A volume of water is allowed to flow out of the permeability panel reservoir and into a glass graduate. The volume of water is captured in the graduate and compared to the volume of water lost from the reservoir.	0.1% or 0.02 grams	Permeability/ASTM D-5084
Calipers	Annual	Determine the measurement error by subtracting the caliper measurement from the certified gage block values.	0.001 ± 0.001 inches	Permeability/ASTM D-5084, Density EM-1110-2-1906
ASTM Weights	Annual	NIST traceable to brass weights	0.1% or 0.02 grams of 2 decimal place balance (ASTM Class Weights)	Applicable to all tests

7.5 Specific Gravity: ASTM D-854

Specific gravity is the ratio of the mass of a volume of solid soil particles at a stated temperature to the mass in air of the same volume of gas-free distilled water at a stated temperature. Specific gravity is determined by using a pycnometer and a balance. Results are determined based upon by gravimetric measurement.

7.6 Unit Weight Density: EM-1110-2-1906, Appendix II

Unit weight density of a soil is derived by taking the weight and volume of an undisturbed sample. Density determination is used to define the density of the in situ field soil conditions.

7.7 Porosity: EM-1110-1906, Appendix II

Porosity is the ratio of the aggregate volume of interstices, in a rock or soil, to its volume. Porosity is expressed as a percentage and determined by calculating the difference in the weight in the volume of the dry specimen from the volume of the wet specimens and dividing by the volume of the wet specimen.

Chemical Analysis of Nitrogen, Ammonia: Method 350.2 - Colorimetric, Titrimetric; Potentiometric - Distillation Procedure. Measurement of ammonia-nitrogen exclusive of total Kjeldahl nitrogen (TKN) in soil samples can be determined by EPA Method 350.2. Sample preparation may vary depending on the type of matrix of the sample. The sample is buffered at a pH of 9.5 with a borate buffer in order to decrease hydrolysis of cyanates and organic nitrogen compounds, and is then distilled into a solution of boric acid. The ammonia in the distillate can be determined colorimetrically by nesslerization, titrimetrically with standard sulfuric acid with the use of a mixed indicator, or potentiometrically by the ammonia electrode. The choice between the first two procedures depends on the concentration of the ammonia.

Practical Quantification Limit (PQL) for Nitrogen, Ammonia by Method 350.2

		Soil	
Parameter/Method	Analyte	PQL	Units
Nitrogen, Ammonia/350.2	Nitrogen, Ammonia	4.0	milligrams per kilogram (mg/kg)

Calibration, Target Acceptance Criteria for Nitrogen, Ammonia by Method 350.2

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Nitrogen, Ammonia/ 350.2	Field Duplicate	10% of analyses	≤ 30% relative percent difference(RPD)	1. Recheck 2. Recalibrate

Chemical Analysis for Phosphorus: Method 365.1 - Colorimetric, Automated, Ascorbic Acid. Phosphorus of soil samples can be determined by EPA Method 365.1. Sample preparation may vary depending on the type matrix of the sample. The methods are based on reactions that are specific for the orthophosphate ion. Thus, depending on the prescribed pretreatment of the sample, the various forms of phosphorus may be determined. Except for in-depth and detailed studies, the most commonly measured forms are phosphorus and dissolved phosphorus, and orthophosphate and dissolved orthophosphate. Hydrolyzable phosphorus is normally found only in sewage-type samples. Insoluble forms of phosphorus are normally determined by calculation.

PQL for Phosphorus by Method 365.1

Parameter/Method	Analyte	Soil	
		PQL	Units
Phosphorus/365.1	Phosphorus	2.5	mg/kg

Calibration and Target Acceptance Criteria for Phosphorus by Method 365.1

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Phosphorus/365.1	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Chemical Analysis of Nitrogen, Kjeldahl, Total: Method 351.3 - Potentiometric, Ion Selective Electrode. Measurement of TKN in soil can be determined by EPA Method 351.3. Three alternatives are listed for the determination of nitrogen ammonia (NH_3) after distillation: titrimetric method for concentrations exceeding 1 mg N/L; colorimetric for

concentrations less than 1 mg N/L; potentiometric for 0.05 to 1,400 mg N/L. High nitrate concentrations (10 x or more than TKN level) result in low TKN values. The reaction between nitrate and ammonia (NH_3) can be prevented by the use of an ion exchange resin (chloride form) to remove the nitrate prior to the TKN analysis. Colorimetric determination is prepared in Nessler tubes and absorbance read at 425 nanometer (nm). For titrimetric determination, distillate in a receiving flask is titrated with standards sulfuric acid. For potentiometric determination, Method 350.3 is used. All solutions are made with ammonia-free water.

PQL for TKN by Method 351.3

Parameter/Method	Analyte	Soil	
		PQL	Units
Nitrogen, Kjeldahl, total /351.3	Total Kjeldahl nitrogen	10.0	mg/kg

Calibration and Target Acceptance Criteria for TKN by Method 351.3

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
TKN/351.3	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Soil pH: EPA, SW-9045. Soil pH can be measured on soil and waste samples by Method SW-9045. Method SW-9045 can measure pH by an electrometric procedure applicable to soils, solid wastes, sludges, or nonaqueous liquids. The sample is mixed with reagent water and the pH of the resulting aqueous solution is measured. The pH of the soil sample is measured by use of a pH meter, electrodes, reagent grade chemicals, and buffers. The instrument/electrode system must be calibrated at a minimum of two points that bracket the expected pH of the samples and are approximately three pH units or more apart.

Calibration and Target Acceptance Criteria for Soil pH by SW-9045

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Soil pH/SW-9045	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Chemical Analysis of Water and Wastewater: Method 310.1 - Alkalinity. Drinking, surface, saline water, domestic, and industrial wastes can be tested for alkalinity titrimetrically. The method is performed by using an unaltered sample that is titrated to an electrometrically determined end point of a pH 4.5. A pH meter or electrically operated titrator that uses a glass electrode that can be read to 0.05 pH units is used to read the pH . Alkalinity determination is based upon normality of the sample with sodium carbonate solution and the amount of the sample used for analysis.

PQL for Alkalinity by Chemical Analysis of Water and Wastewater, Method 310.1 - Alkalinity

Parameter/Method	Analyte	Water	
		PQL	Units
Alkalinity/310.1	Alkalinity	1.25	milligram per liter (mg/L)

Calibration and Target Acceptance Criteria for Alkalinity by Method 310.1

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Alkalinity/310.1	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Methane: Method RSKSOP-175. Method RSKSOP-175 is applicable to the preparation of water samples for analysis of the headspace to quantity part per million (ppm) levels of dissolved gases in water samples. Although this method is specific for determining methane, ethene,

ethane, and nitrous oxide, it has also been used to determine vinyl chloride, nitrogen, oxygen and carbon dioxide.

PQLS for RSKSOP-175

Parameter/Method	Analyte	Water	
		PQL	Units
Methane/RSKSOP-175	Methane	.001	mg/L (ppm)[1]

[1]Methane detection limit is 1 part per million (ppm) in the headspace vapor the water sample.

Calibration and Target Acceptance Criteria for Methane by RSKSOP-175

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Methane/RSKSOP-175	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Total Dissolved Solids: EPA Method 160.1. Drinking, surface, saline water, and waste-water samples can be tested for residue, filterable total dissolved solids by EPA Method 160. A well-mixed sample is filtered through a standard glass fiber filter. The filtrate is evaporated and dried to a constant weight at 180°C. The increase in dish weight represents the total dissolved solids or the filtrate from the residue that was nonfilterable. Highly mineralized waters with considerable calcium, magnesium, chloride, and/or sulfate content may be hygroscopic and will require prolonged drying, desiccation, and rapid weighing. Samples with high concentrations of bicarbonates require prolonged drying.

PQLS for Total Dissolved Solids (TDS) by Method 160.1

Parameter/Method	Analyte	Water	
		PQL	Units
TDS/160.1	TDS	10.0	mg/L

Calibration and Target Acceptance Criteria for TDS by EPA Method 160.1

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
TDS/160.1	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

Nitrate/Sulfate: EPA Method 300.0 Ion Chromatography. This is an ionchromatographic (IC) method applicable to the determination of the anions in drinking water, surface water, and mixed domestic and industrial wastewater. A small volume of sample, typically 2 to 3 milliliters is introduced into an ion chromatograph. The anions of interest are separated and measured using a system comprised of a guard column, separator column, suppressor column, and conductivity detector.

PQLS for EPA Nitrate Analysis by Method 300.0

Parameter/Method	Analyte	Water	
		PQL	Units
Nitrate/300.0	Nitrate	0.1	mg/L

Calibration and Target Acceptance Criteria for Nitrate by Method 300.0

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Nitrate/300.0	Calibration Check Standard	10% of analyses	90 -110% Recovery	Repeat calibration and subsequent analyses
	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	5% of analyses	70 -130 % Recovery, ≤ 30% RPD	Flag data
	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

PQLS for EPA Sulfate Analysis by Method 300.0

Parameter/Method	Analyte	Water	
		PQL	Units
Sulfate/300.0	Sulfate	5.0	mg/L

Calibration and Target Acceptance Criteria for Sulfate by Method 300.0

Parameter/Method	QC Check	Recommended Frequency	Target Acceptance Criteria	Laboratory Corrective Action
Sulfate/300.0	Calibration Check Standard	10% of analyses	90 -110% Recovery	Repeat calibration and subsequent analyses
	MS/MSD	5% of analyses	70 -130 % Recovery, ≤ 30% RPD	Flag data
	Field Duplicate	10% of analyses	≤ 30% RPD	1. Recheck 2. Recalibrate

TAB

8.0

8.0 Data Reduction, Validation, and Reporting

Section 8.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) does not apply to the Carswell Delivery Order No. 0039 sanitary sewer system QA program. The following text replaces Section 8.0 of the revised interim draft Basewide QAPP entirely.

8.1 Data Reduction and Validation

Data collected during the field activities will be validated by checking the procedures used and comparing the data to previous measurements. The project chemist will be responsible for checking field QC samples to verify that field measurements and sampling protocol have been observed and adhered to. These checks will include:

- Use of SOPs
- Calibration method and frequency
- QC bottle lot number
- Date/time sampled
- Temperature
- Sampling location coordinates
- Preservation
- Samplers
- Laboratory
- AR/COC record number
- Date shipped
- Airbill number.

Analytical data reduction, validation, and reporting within the laboratory prior to release of the data report to IT will be performed as follows and as described in the analytical laboratory QAM. Analytical data are generated by the gas chromatography (GC) or high-performance liquid chromatography (HPLC) computer, ion chromatograph, and associated laboratory instrumentation. Outputs include identifications of compounds, concentrations, retention times, and comparisons to standards.

Outputs are in graphic form (chromatograms) and/or bar graph (spectra), and printed tabular form in the standard formats specified for each analysis. If incomplete or incorrect outputs are

received, corrective actions are taken according to procedures established for each type of analysis, consistent with manufacturer recommendations.

In the data review process, the data are compared to information such as the sample history, sample preparation, and QC sample data to evaluate the validity of the results. Corrective action is minimized through the development and implementation of routine internal system controls. Analysts are provided with specific criteria that must be met for each procedure, operation, or measurement system.

Laboratory data verification includes dated and signed entries by analysts and group leaders on the worksheets and logbooks used for samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data.

Steps and checks used to validate precision and accuracy of the measured parameters and to support the representativeness, comparability, and completeness include:

- Description of the calibration performed
- Description of routine instrument checks (background noise levels, drift, linearity, etc.)
- Documentation of the traceability of instrument standards, samples, and data
- Documentation of analytical methodology and quality control methodology
- Description of the controls taken to determine and minimize interference contaminants in analytical methods (use of reference blanks and check standards for method accuracy and precision)
- MS recoveries, RPD between the MS and the MSD and surrogate recoveries
- Description of routine maintenance performed
- Documentation of sample preservation and transport when shipped elsewhere.

Laboratory validation responsibilities are as follows:

- ***Analyst.*** Responsible for the actual analyses performed. If several types of analyses are performed, there will be more than one analyst. The data are organized and placed into the job envelope.

- ***Analyst or Group Leader.*** Responsible for reviewing data, calculations, and the results for 20 percent of all jobs. If an analyst performs this function, it is always a second, independent analyst from the analyst performing the analyses. This person is responsible for initialing and dating each page reviewed. Records are to be kept in logbooks to track jobs reviewed.

- ***Analyst or Group Leader.*** Responsible for verifying that the results as reported have been correctly typed. The chemist verifying the typing is the same chemist who performed the analyses. In a job where more than one chemist has performed the analyses, the chemist working with the "main" group is responsible for signing the report.

- ***Group Leader.*** Responsible for reviewing 100 percent of all reports to verify that the information, format, data, completeness, and typing are correct. Revised reports, duplicate analyses, and secondary group results are to be checked for comparable results as well. Initials of this person are to be placed at the bottom left corner of each report. This person is responsible for organizing the job envelope(s) for final review by the laboratory manager, operations manager, or technical director.

- ***Laboratory QA/QC Coordinator.*** Responsible for reviewing at least 5 percent of all job envelopes. The laboratory QA/QC coordinator verifies that all steps documented are accomplished as stated, and will take corrective action and proceed further with an investigation if the protocol is not adhered to.

- ***Laboratory Technical Director/Project Manager.*** Ultimately responsible for the issued report. Final approval for release of the report is given and the report is then signed. The technical director has the authority to designate specified personnel to manage this responsibility.

8.2 Data Reports

The format and content of a data report from the laboratory are dependent on project needs such as client or contract requirements, government agency reporting formats, and whether explanatory text is required. However, the following items are applicable to data inputs:

- A case narrative discussing the analytical problems encountered, if any, and the impact such problems had on data usability is included to summarize the data reported. If data were rejected by the laboratory or qualified to indicate a significant compromise of precision, accuracy, or representativeness, then these data should be specifically addressed or a description or reference list describing the procedures and instrumentation used should also be included. In addition, the samples associated with the deliverable should be listed. A cross-index table of laboratory sample identifications and client-assigned sample identifications should also be included.

- AR/COC forms.

- Tabulated results, including final dilution volume of sample extracts, sample size, wet-to-dry ratios for solid samples, and concentrations of compounds of interest (reported in units identified to two significant figures unless otherwise justified). These results should be checked for accuracy and the report signed by the laboratory manager or designee.

- Tabulated instrument detection limits and limits of detection achieved for the samples.

- Original data quantification report for each sample.

- Method blanks associated with each sample, quantifying all compounds of interest identified in these blanks.

- Recovery assessments and replicate sample summaries. Laboratories should report all surrogate spike recovery data for each sample, and a statement of the range of recoveries should be included in reports using these data.

- Results for all other QC checks and calibration control checks conducted by the laboratory.

- All data qualification codes assigned by the laboratory, their description, and explanations for all departures from the analytical protocols.

- Raw data from the analyses, as appropriate.

The final data presentation shall be checked in accordance with data verification requirements and approved by the laboratory technical director/project manager. The project manager is responsible for including this validated data as applicable in each technical report.

8.3 Data Management

Field activities are the sources of most collected data, which will be produced by the sample coordinator and supervised by the field supervisor. Chapter 3.0 of the FSP provides a detailed discussion of the sampling program for sanitary sewer systems at NAS Fort Worth. Field data forms will be completed for data entry into an electronic database. The sample coordinator is responsible for collecting all required field data on the appropriate forms, entering data from the field forms into the database system, transferring the files to the main office, and submitting all forms to the project data coordinator. The data coordinator is responsible for verification of data entry from the field forms into the database system, making copies of all forms, and storing the originals in the project files. Once the data have been verified, they will be reported and downloaded in the requested format. Each field data form contains information that will be used to populate the required data files within the IRPIMS. Field data collection forms are included in Appendix A. IT has prepared specific IRPIMS field collection forms to ensure compliance with IRPIMS requirements.

Upon receipt, the data coordinator will record receipt of the documents and diskettes, make a copy of the diskettes, and deliver the diskette copies to the database administrator for uploading into the IRPIMS database. The data coordinator will also make copies of the data packages received for verification against the IRPIMS database. All originals, including diskettes, will be stored in the project files.

Once the database administrator has imported the data from the diskettes, reports will be generated to verify a complete relationship between data manually entered and data electronically uploaded. After the verification is complete, the IRPIMS-required files can be generated.

Sample Identification. The data coordinator is responsible for preassigning all field sample numbers. The sample numbering system to be utilized in the field will be in accordance with preassigned sequential alphanumeric characters. These characters, such as X1234, will be assigned prior to field efforts and will correspond to a unique sample from a sample location. QC samples, for instance, will be indistinguishable from original field samples by just the sample

number. However, other parameters are also assigned to a sample to distinguish the media, location, site, and QC type (if applicable). All of these values will be preassigned to the projected samples prior to initiation of field efforts. This additional information will be captured on the sample collection logs, but not completely on the sample labels or on the AR/COC forms. This process provides for a complete unbiased analysis of project samples by the laboratory. The one exception to this procedure will be the MS and MSD samples, which will be designated on the AR/COC record in the sample description/type column only, and as a trailer.

8.4 Deliverables

8.4.1 Hard Copy Deliverables

The laboratory will provide the raw instrument data analytical results in a format based on the EPA format. These data packages will represent "stand alone" deliverables, which include instrument data, parameter-specific QC documentation, calibration, and calibration check performance information. Data validation deliverables will also include copies of the signed AR/COC forms, along with validation narratives from the person(s) performing the data validation.

The deliverables shall be presented to the project chemist. The forms shall be used when reporting any data and in submitting the final data package before its inclusion in an appendix or summary tables of a report.

8.4.2 Electronic Deliverables

Electronic data transfers (EDT) from the laboratory to the analytical data coordinator will follow a specific format to allow for IRPIMS deliverables to AFCEE. This format is specified in Appendix B.

File formats and associated information for the IRPIMS deliverable are defined in the current version of the *IRPIMS Data Loading Handbook*. All data submissions will be consistent with, and inclusive of, all project activities required by the Statement of Work and the current version of the *Handbook to Support the Installation Restoration Program*.

8.5 Data Validation

Data validation will be performed at 10 percent on all sample results. The data validation staff of chemists is trained to perform data validation procedures outlined in the EPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (February 1994, EPA-540/R-94/012) and the *Contract Laboratory Program National Guidelines for Inorganic Data Review* (February 1994, EPA-540/R-94/013). Validation of the EPA methods will follow the functional guidelines as closely as possible. Validation will involve data flagging, blank evaluation, evaluation of duplicates, and statistical evaluation of data. Table 8-1 includes a list of commonly used organic and inorganic data qualifiers that may be used by the data validators and the laboratory to flag the data.

Table 8-1

Laboratory Qualifier and Definition Table for Organic and Inorganic Analysis
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Qualifiers	Definition
Organic Qualifiers	
U	The analyte is not detected at a concentration above the MDL. The sample result is reported as not detected at the PQL.
J	The analyte is detected at a concentration above the MDL but below the PQL. The sample result is reported at the concentration detected as an estimated value.
B	The analyte was detected in an associated laboratory preparation blank.
D	The sample result reported is taken from the analysis of a diluted sample.
R	The data are unacceptable due to deficiencies in the ability to analyze the sample and meet QC criteria.
E	Concentration exceeded the calibration range of the instrument.
Inorganic Qualifiers	
U	The analyte is not detected at a concentration above the instrument detection limit (IDL). The sample result is reported as not detected at the IDL.
B	The analyte is detected at a concentration above the IDL but below the contract required detection limit (CRDL) stated in the CLP protocol. The sample result is reported at the concentration detected as an estimated value.
R	The data are unacceptable due to deficiencies in the ability to analyze the sample and meet QC criteria.

TAB

9.0

9.0 Systems and Performance Audits, Performance Evaluation Programs, Magnetic Tape Audits, and Training

Section 9.0 of the interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program.

TAB

10.0

10.0 Preventive Maintenance

Section 10.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program.

TAB

11.0

11.0 Corrective Action/Nonconformances Procedures

Section 11.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) does not apply to the Carswell Delivery Order 0039 sanitary sewer system QA program. The following text replaces Section 11.0 of the revised interim draft Basewide QAPP entirely.

Requirements and procedures for documenting the need for corrective actions are described in this section.

11.1 Corrective Action/Nonconformance Report

Problems that require corrective action in the laboratory are documented by the use of a corrective action report. The QA coordinator or any other laboratory member can initiate the corrective action request in the event that QC results exceed acceptability limits, or upon identification of some other laboratory problem. Corrective actions can include reanalysis of the sample or samples affected, resampling and analysis, or a change in procedures, depending upon the severity of the problem.

Nonconforming equipment, items, activities, conditions, and unusual incidents that could affect compliance with project requirements will be identified, controlled, and reported in a timely manner. A nonconformance is defined as a malfunction, failure, deficiency, or deviation that renders the quality of an item unacceptable or indeterminate. The originator (any IT employee) of a Nonconformance Report (Figure 11-1) will describe the finding on the form provided for this purpose and notify the project manager and QA coordinator. Each nonconformance will be reviewed and a disposition given for the item, activity, or condition. The disposition of a nonconformance will be documented and approved by the IT organization responsible for the issuance of the nonconformance. The QA coordinator will concur with the disposition of the nonconformance.

In the laboratory, the laboratory project manager is responsible for assessment of QC sample information. If data fall outside accepted limits, the laboratory project manager will immediately notify the laboratory manager and the responsible group leader. If the situation is not corrected and an out-of-control condition occurs or is expected to occur, the laboratory project manager will notify the analytical and data management team leader and the IT project manager. The

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NONCONFORMANCE REPORT

NCR Number:	Project Name and Number:	Date:	Page_____ of _____

Nonconformance Description (include specific requirement violated):

Identified By:_____ Date:_____

Root Cause of Nonconforming Condition:

Corrective Action to be Taken (include date when action(s) will completed):

To be Performed By:_____ Anticipated Completion Date:_____

Action to be Taken to Preclude Recurrence:

To be Performed By:_____ Anticipated Completion Date:_____

Acceptance By:_____ Date:_____ Acceptance By:_____ Date_____
Project Manager QA Officer

Corrective Actions Completed By and Date:	Verification Completed By and Date:

Figure 11-1
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laboratory manager, laboratory project manager, and the group leaders are responsible for identifying the source of the nonconformance and initiating corrective action. Completion of corrective action should be evidenced by data returning to prescribed acceptable limits. Evidence should be provided to the IT project manager to close out the nonconformance.
The modification, repair, rework, or replacement of nonconforming equipment, items, or activities utilized either in the field or in the laboratory will require the reverification of acceptability. The project manager and QA coordinator will concur on whether these actions require immediate (within 72 hours) corrective action be completed and verified before site work continues. Since nonconformances usually occur in the field, the corrective action will normally be completed by the field activities coordinator (FAC) or someone designated by the FAC.

The equipment, item, or activity that has the deficiency may be temporarily stopped while the nonconformance is being investigated. If, in the opinion of the project manager and the QA coordinator, the nonconformance does not significantly affect the technical quality or use of the work, the work may continue pending resolution of the nonconformance. The basis for such decisions will be documented on the Nonconformance Report and submitted to the QA coordinator for review and approval. The documentation will include the statement that the decision was made prior to continuing with the work. The records of nonconformance and their dispositions will be kept in the project files.

In addition, the project manager will notify AFCEE of significant nonconformances that could impact cost or schedule, or results of the work, and will indicate the corrective action taken or planned. At a minimum, all variances and nonconformances will be included and/or discussed in the RI report.

11.2 Corrective Action System

A system for issuing, tracking, and documenting completion of formal recommendations for corrective action (RCA) exists for addressing significant and systematic problems. RCAs are issued only by a member of the QA group, or a designee in a specific QA role. Each RCA addresses a specific problem or deficiency, usually identified during QA audits of laboratory or project operations. An RCA requires a written response from the party to whom the RCA was issued. A summary of unresolved RCAs is included in the monthly QA report to management. The report lists all RCAs that have been issued, the manager responsible for the work area, and

the current status of each RCA. An RCA requires verification by the QA group that the corrective action has been implemented before the RCA is considered to be resolved. In the event that there is no response to an RCA within 30 days, or if the proposed corrective action is disputed, the recommendation and/or conflict is pursued to successively higher management levels until the issue is resolved.

The analytical laboratory and field screening subcontractor will maintain a corrective action system that is consistent with the issuing, tracking, and documentation described in the preceding paragraph.

TAB

12.0

12.0 Quality Assurance Reports to Management

Section 12.0 of the revised interim draft Basewide QAPP (CH2M Hill, 1996) applies to the Carswell Delivery Order No. 0039 sanitary sewer systems QA program.

TAB

Appendix A

APPENDIX A

IRPIMS SPECIFICATIONS

IT-IRPIMS EDT Format Specifications

v 1.1

File Structure: IT-IRPIMS uses a standard file format for transmitting analytical data. Each file should be in standard DOS format and consist of:

- A header record with the IT project number (1:20), file preparation date(21:28), total record count(29:34), total analysis record count(35:40) and total TIC count(41:46)
- A variable number of records containing analytical data
- A trailer record containing three dollar signs (i.e., **$$$**) followed by blanks

Each individual analytical record must be 292 bytes long, contain only ASCII characters and be terminated by a carriage return. IT-IRPIMS identifies the information included in each record by position. The specific format IT-IRPIMS requires is summarized below.

Position	Field Length	Content	IRPIMS Name	Comments
1-20	20	Project Sample Number		a
21-28	8	Sample Date (as MM/DD/YY)	LOGDATE	b
29-33	5	Sample Time	LOGTIME	b
34-43	10	Lab Batch Number	LABLOTCTL	fi
49-56	8	Lab Matrix		
57-66	10	Lab Sample Number	LABSAMPNUM	a
67-70	4	Laboratory Identification Code	LABCODE	
71-78	8	Sample Prep Date (as MM/DD/YY) (Extraction)	EXTDATE	b
79-83	5	Sample Prep Time (HH:MM) (Extraction Time)	EXTTIME	b
84-91	8	Analysis Date (as MM/DD/YY)	ANADATE	b
92-96	5	Analysis Time (HH:MM)	ANATIME	b
97-116	20	Method Blank Association		i
117-126	10	Panelcode		
127-129	3	Result Type		f
130-140	11	CAS Number		
141-150	10	Result	PARVAL	ck
151-155	5	Result Qualifier	EPA_FLAGS	
156-165	10	2-Sigma Error (for Radiological results only)	PARUN	
166-175	10	Units of Measure	UNITS	cg¥
176-182	7	Retention Time		d
183-212	30	Parameter Name		
213-222	10	Detection Limit (Reporting Limit)	LABDL	ceg
223-229	7	Dilution Factor		
230-235	6	Extraction Method Code	EXMCODE	¥
236-237	2	Parameter Classification Code	PVCCODE	f¥
238-251	14	Expected Result	EXPECTED	cfgh
252-259	8	Analytical Method Code	ANMCODE	¥
260	1	Basis	BASIS	j¥
261-272	12	IRPIMS parameter code	PARLABEL	¥
273-274	2	IRPIMS qualifier	PARVQ	gk¥
275	1	Sample Purpose		
276-279	4	Sample Preparation		
280	1	TCLP Indentifier		
281-282	2	IRPIMS Run Number	RUN_NUMBER	
283-292	10	SDG Number / Work Order Number		

Comments:

- Valid value tables are provided.
- ¥ IRPIMS Data Loading Valid Value List should be referenced and used exclusively.

a. The laboratory QC sample number should be uniquely identified in both the project and lab sample number fields. Laboratory method blanks, blank spikes and blank spike duplicates should not share laboratory sample numbers.

b. The sample date, sample time, prep date, prep time, analysis date and analysis time are required fields for all samples whether they are field or laboratory generated.

c. The detection limit must be greater than 0.0001 and less than 9999.9999; remember to convert the Result, Expected Result, and Unit of Measure fields accordingly.

d. Retention time is required for Tentatively Identified Compounds (TICs) only. For target compounds and surrogates, this field should be left blank.

e. The value applied should be the laboratory's standard reporting limit for the analysis with respect to matrix, adjusted mathematically for all applicable dilution and/or dryness factors. This value should be defensible, if necessary, by the required method detection or quantitative studies used to demonstrate method performance.

f. These fields should be in accordance with the IRPIMS Valid Value Handbook.

g. When submitting percent recovery records, the (A) EXPECTED value must be **100.0**, the (B) IRPIMS qualifier must by '**%**', the (C) measure of unit must be '**PERCENT**' and the (D) detection limit must be **NULL**. ** The exceptions include %Solid, %Carbon and %Moisture records. In these cases, the (A) EXPECTED value must be **0.0**, the (B) IRPIMS qualifier must be '=', the (C) units of measure must be '**PERCENT**' and the (D) detection limit must be **NULL**.

h. The EXPECTED field should be populated with (A) '0.0' for original field samples, (B) the corresponding parameter's original result plus the added spike concentration that are reported as a concentration rather than a percent recovery and (C) the corresponding field duplicate original result for both field and lab initiated duplicates.

   ** Any spiked sample can be reported as percent recoveries or concentrations as preferred providing there is consistency throughout the project.

i. Per record, this field should contain the appropriate batch sample number which is associated to the given project sample number, method, and parameter. This field is often used for blank correcting purposes and should always be populated.

j. When the matrix analyzed is water, air or gas, the BASIS should be 'X'. If the matrix is soil or tissue will the BASIS should be 'D' if reported on a dry weight basis or 'W' if reported on a wet weight basis.

k. For "non-detect" records, load '0.0' in the result field and set the IRPIMS qualifier to 'ND'; for detected compounds above the reporting limit, report the value in the result field and set the IRPIMS qualifier to '='; and, for results detected below the reporting limit, report the value in the result field and set the IRPIMS qualifier to 'TR'.

Table 1. Panelcode

Panelcode	Description
ASBESTOS	Asbestos Analyses
DIOXIN	Dioxin and Furan Analyses
EXPL	Nitro-aromatic Analyses
HERB	Herbicide Analyses
METALS	Metals Analyses
PEST/PCB	Pesticide and PCB Analyses
RAD	Radiological Analyses
SVOC	Semi-Volatile Organic Analyses
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organics Analyses
WETCHEM	Wet Chemistry, General Chemistry, Classical Parameters

These panelcodes are intended to group compounds/elements by chemical classification independent of the analytical method employed.

Table 2. Result Types

Result Type	Category	Description
BS	Lab QC	Blank spike; Laboratory Control Sample (LCS)
LB	Lab QC	Blank
BD	Lab QC	Blank spike duplicate
RM	Lab QC	Reference Material
FD	Field QC	Field duplicate
LR	Lab QC	Laboratory replicate
MB	Lab QC	Method blank
MS	Lab QC	Matrix spike
SD	Lab QC	Matrix spike duplicate
RD	Field QC	Regulatory duplicate collected in the field by a regulator
TRG	Field Original	Regular environmental field sample
FR	Field QC	Split sample; each analyzed for same parameters by different laboratories.
AB	Field QC	Ambient condition blank (Water testing at current conditions)
FB	Field QC	Material Blank (Testing materials used on site; gravel packs, cement, etcetera)
TB	Field QC	Trip blank
EB	Field QC	Equipment rinsate

Table 3. Result Qualifiers

Qualifier	Qualifier Category	Description
U	O	Compound was analyzed for but was not detected ("Non-detect")
J	O	Estimated value
C	O	Pesticides only. Presence confirmed by GC/MS
B	O	Analyte found in both sample and associated blank
E	O	Estimate: result outside linear range of instrument. GC/MS only
D	O	Dilution run. Initial run outside linear range of instrument
A	O	Indicates that the TIC is a suspected aldol condensation product
X	O	Laboratory defined.
B	I	Value less than the CRDL but greater than or equal to the IDL
E	I	Value estimated due to interference
N	I	Spiked sample recovery not within control limits
S	I	Reported value determined by Method of Standard Additions (MSA).
W	I	Post-digestion spike out of control limits
*	I	Duplicate analysis not within control limits
+	I	Correlation coefficient for the MSA is less than 0.995

Table 4. Sample Purpose

Sample Purpose	Description
N	Target parameter for analysis
T	Tentatively identified compound
I	Internal Standard
S	Surrogate compound added to the sample by the laboratory

Table 5. Sample Preparation

Prep Code	Description
CIT	Waste extraction test using sodium citrate
DION	Waste extraction test using de-ionized water
DIL	Dilution
DIL1	First dilution (used where multiple dilutions were necessary)
DIL2	Second dilution (used where multiple dilutions were necessary)
DIL3	Third dilution (used where multiple dilutions were necessary)
DIL4	Fourth dilution (used where multiple dilutions were necessary)
N	Normal preparation associated with analytical method used
REX	Re-extraction
FIL	Sample filtered by laboratory

Table 6. Toxicity Characteristic Leaching Procedure Identifier

TCLP Flag	Description
N	Analyzed utilizing non-TCLP extractions
Y	TCL Procedures executed on specified record

General Requirements:

For such things as analytical methods(ANMCODE), extraction methods (EXMCODE) and parameter labels (PARLABEL) it is the laboratory's responsibility to coordinate with the IRPIMS Help Desk in acquiring a new valid value when the appropriate value is not listed. International Technology should receive a copy of the AFCEE Letterhead with the reference number stating the addition of a new valid value from the laboratory.

It is the laboratory's responsibility to verify/validate the completeness and correctness of analytical method (ANMCODE) and extraction method (EXMCODE) combinations. The validity of the combination must also be matched with the general matrix (water or soil).

All fields should contain capital letters with the exception of the parameter field (position 181:210). The full parameter name should be capitalized appropriately. On a projects-by-project basis, parameter valid value lists will be provided grouped by requested analytical methods.

Until the initiation and sole use of the IRPIMS Run Number, the following trailors must be added to the existing project sample numbers for lab initiated duplicates '-LR', matrix spikes '-MS', matrix spike duplicates '-SD', dilutions '-DL' and re-extractions(re-runs) '-RE'. For multiple dilution runs the solutions would be '-DL1','-DL2' etcetera. This will allow for IRPIMS processing while the IRPIMS Run Number is piloted. The IRPIMS Run Number field should so that the logic used to populate this field can be evaluated.

IRPIMS Run Number:

This definition came straight from the IRPIMS Help Desk.
The IRPIMS database can accept multiple records for given tests on an IRP sample using a key field which identifies the analytical run number. The RUN_NUMBER field is increased by one each time a given test is performed on an IRP sample. Use of this field permits a complete history of test and results records to be maintained for a given IRP sample. It should only be incremented when a given test used to determine multiple analytes is run on different days or in different analytical batches for a given IRP sample. The RUN_NUMBER field is not to be increased for sample tested for quality control purposes in which a given test is run on different days or in a different analytical batch.

The RUN_NUMBER field is always 1 for first/initial analytical run/batch for all methods per sample. When the same sample and analytical method is run in a different batch (i.e., dilutions, re-extractions, etcetera) the RUN_NUMBER will be incremented sequentially. When methods are analyzed over multiple days such as SW6010, the RUN_NUMBER should be incremented sequentially by dates.

Sample Number	Analytical Method	Analytical Date	Purpose for data run	RUN #
A1234	M8015D	8-10-95	initial	1
A1234	SW6010	8-10-95	initial	1
A1234	SW6010	8-11-95	same batch different dates	2
A1234	SW7196	8-10-95	initial	1
A1234	SW8080	8-12-95	initial	1
A1234	SW8080	8-13-95	dilution	2
A1234	SW8240	8-11-95	initial	1
A1234	SW8240	8-11-95	dilution	2
A1234	SW8270	8-10-95	initial	1
A1234	SW8270	8-11-95	re-extraction	2
A1234	SW8270	8-11-95	first dilution	3
A1234	SW8270	8-16-95	second dilution	4
A1234	SW9310	8-10-95	initial	1

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ADMINISTRATIVE RECORD

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